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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/814,673	03/30/2004	Richard B. Irwin	TI-36795	7727

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EXAMINER	
DICKEY, THOMAS L	

ART UNIT	PAPER NUMBER
2826	

DATE MAILED: 07/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/814,673	IRWIN ET AL.	
	Examiner	Art Unit	
	Thomas L. Dickey	2826	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 June 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-36* is/are pending in the application.

4a) Of the above claim(s) *21-30 and 32-34* is/are withdrawn from consideration.

5)☒ Claim(s) *11-20* is/are allowed.

6)☒ Claim(s) *1-10* is/are rejected.

7)☐ Claim(s) *31,35 and 36* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *21 June 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. The amendment filed on 06/16/2005 has been entered.

Information Disclosure Statement

2. If applicant is aware of any relevant prior art, he/she requested to cite it on form **PTO-1449** in accordance with the guidelines set forth in M.P.E.P. 609.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless --
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

A. Claims 1-3,6-8, and 10 stand rejected under 35 U.S.C. 102(b) as being anticipated by TOHYAMA (5,710,447).

With regard to claims 1-3 and 6 Tohyama discloses a Schottky diode with a semiconductor substrate 1 including Si; a first metal area 14a including PtSi coupled to said semiconductor substrate 1; a barrier layer 15 including SiO_2 coupled to said first metal area 14a; and a second metal area 16 coupled to said barrier layer 15. Note figure 7B and column 7 lines 35-43 of Tohyama.

With regard to claims 7,8, and 10 Tohyama discloses a Schottky diode with a semiconductor substrate 1 including Si; a first metal area 14a including PtSi coupled to said semiconductor substrate 1; and a second metal area 16 coupled to said first metal area 14a. Note figure 7B and column 7 lines 35-43 of Tohyama.

B. Claims 1,2,4,6-8, and 10 stand rejected under 35 U.S.C. 102(b) as being anticipated by WEI et al. (4,672,412).

With regard to claims 1,2,4, and 6 Wei et al. discloses a Schottky diode with a semiconductor substrate 42 including Si; a first metal area 46 including PtSi coupled to said semiconductor substrate 42; a barrier layer 50 including SiN coupled to said first metal area 46; and a second metal area 54 coupled to said barrier layer 50. Note figure 3 and column 7 lines 5-14,29,36, and 37 of Wei et al.

With regard to claims 7,8, and 10 Wei et al. discloses a Schottky diode with a semiconductor substrate 42 including Si; a first metal area 46 including PtSi coupled to said semiconductor substrate 42; and a second metal area 54 coupled to said first metal area 46. Note figure 3 and column 7 lines 5-14,29,36, and 37 of Wei et al.

C. Claims 1,2, and 5-10 stand rejected under 35 U.S.C. 102(b) as being anticipated by IRANMANESH ET AL. (5,059,555).

With regard to claims 1,2,5, and 6 Iranmanesh et al. discloses a Schottky diode with a semiconductor substrate 14 including Si; a first metal area 52 including PtSi coupled to said semiconductor substrate 14; a barrier layer 54 coupled to said first metal area 52; and a second metal area 51 including $TiSi_2$ coupled to said barrier layer 54. Note

figure 1, column 4 lines 66-67, column 5 lines 51-53 and 63, and column 6 lines 1-14 of Iranmanesh et al.

With regard to claims 7-10 Iranmanesh et al. discloses a Schottky diode with a semiconductor substrate 14 including Si; a first metal area 52 including PtSi coupled to said semiconductor substrate 14; and a second metal area 51 including $TiSi_2$ coupled to said first metal area 52. Note figure 1, column 4 lines 66-67, column 5 lines 51-53 and 63, and column 6 lines 1-14 of Iranmanesh et al.

Allowable Subject Matter

4. Claims 11-20 are allowed over the references of record because none of these references disclosed or can be combined to yield the claimed invention such as an integrated circuit comprising a semiconductor substrate; a first Schottky diode coupled to said semiconductor substrate, said first Schottky diode having a first amount of a first metal coupled to said semiconductor substrate and a second amount of a second metal coupled to said first amount of a first metal; and a second Schottky diode coupled to said semiconductor substrate, said second Schottky diode having a third amount of said first metal coupled to said semiconductor substrate and a fourth amount of said second metal coupled to said third amount of said first metal; wherein said first amount is at least .1 % more than said third amount and said second amount is at least .1 % more than said fourth amount, as recited in claims 11 and 17.

Claims 31, 35, and 36 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

5. Applicant's arguments filed 06/16/2005 have been fully considered but they are not persuasive.

It is argued, at page 13 of the remarks, that "The Applicants respectfully traverse the assertion in the Office Action (page 3) that element 15 is a barrier layer ... element 15 is for electrical isolation (column 7 lines 44-48)." However, there is nothing inconsistent with a barrier layer providing electrical isolation.

It is argued, at page 14 of the remarks, that "[Tohyama's element 15] is not a diffusion barrier layer as advantageously claimed." However, in response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., "diffusion barrier layer," it being noted that Applicant claims only a barrier layer, in its broadest reasonable sense) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

It is further argued, at page 13-14 of the remarks, that "The Applicants respectfully traverse the assertion in the Office Action (page 3) that element 16 is a second metal area in Tohyama..... Applicants respectfully submit that Tohyama's element 16 is a

shade film that is not part of the Schottky diode." However, Applicant's claim language requires "a second metal area coupled to [a] barrier layer" (claim 1). Tohyama's element 16 meets the claims by virtue of being metal and being adjacent to barrier layer 15 (column 7 line 45).

It is argued, at page 14 of the remarks, that "Wei et al. teaches away from the advantageously claimed invention because Wei et al. teaches a single metal Schottky diode structure (FIG. 3, column 7 lines 15-28)." However, column 7 lines 15-28 of Wei et al. does not recite a single metal Schottky diode structure. The cited passage merely describes one possible process for making a Schottky metal electrode that is a portion of Wei et al.'s Schottky diode.

It is argued, at page 14 of the remarks, that "[Wei et al. 's element 50] is for electrical isolation (column 7 lines 29-36, Fig. 3): it is not a diffusion barrier layer as advantageously claimed." However, in response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., "diffusion barrier layer," it being noted that Applicant claims only a barrier layer, in its broadest reasonable sense) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

It is argued, at page 14 of the remarks, that "Wei et al.'s element 54 provides an ohmic contact to the Schottky diode 44/46 (i.e. the work function of the metal is less than that of the semiconductor)." However, this statement is unsupported by Wei et al.'s dis-

closure. In point of fact Wei et al. states, "column readout electrodes 54a-54d, respectively, are capacitively coupled to respective Schottky metal electrodes 46a-46d." Column 8 lines 34-35.

It is argued, at pages 15-16 of the remarks, that "Iranmanesh et al. teaches away from the advantageously claimed invention because Iranmanesh et al. teaches a structure having two adjoining single metal Schottky diodes, namely from the emitter to the base and from the collector to the base (FIG. 1, column 3 lines 50-55, column 5 lines 51-62; note that the first single metal Schottky diode is comprised of elements 52/14 in location 50, while the second single metal Schottky diode is comprised of elements 51/14 in location 30)." However, this statement appears to support the examiner's finding that first metal area 52 is coupled to semiconductor substrate, while doing nothing to refute the examiner's finding that barrier layer 54 is coupled to first metal area 52 and second metal area 51 is coupled to barrier layer. Applicant cites column 5 lines 51-62 of Iranmanesh et al. Immediately after the Applicant's cited passage, at line 63, Iranmanesh et al. state that "PtSi 52 is deposited and reacted so that one end contacts the $TiSi_2$." (Note, column 5 lines 51-53, that the "$TiSi_2$" referred to in this passage is second metal area 51). Shortly thereafter, at column 6 lines 7-10, Iranmanesh et al. state, "A barrier metal interconnect region 54 is ... provided over the $TiSi_2$ 51 and PtSi 52 areas." This is the *prima facie* case of anticipation provided by Iranmanesh et al.: coupling between substrate 14 and first metal area 52; then between first metal area 52 and barrier metal interconnect region 54, and then between barrier metal interconnect region 54 and

second metal area 51. Applicant's pointing out additional features found in Iranmanesh et al. does nothing to refute the *prima facie* case of anticipation.

With regard to claim 7 it is argued, at page 16 of the remarks, that "The Applicants respectfully traverse the assertion in the Office Action (page 3) that element 16 is a second metal area in Tohyama..... Applicants respectfully submit that Tohyama's element 16 is a shade film that is not part of the Schottky diode." However, Applicant's claim language requires "a second metal area coupled to [a] barrier layer" (claim 1). Tohyama's element 16 meets the claims by virtue of being metal and being adjacent to barrier layer 15 (column 7 line 45).

With regard to claim 7 it is further argued, at page 16 of the remarks, that "Wei et al. teaches away from the advantageously claimed invention because Wei et al. teaches a single metal Schottky diode structure (FIG. 3, column 7 lines 15-28)." However, the passage applicant cites, column 7 lines 15-28 of Wei et al., does not recite a single metal Schottky diode structure. The cited passage merely describes one possible process for making a Schottky metal electrode that is a portion of Wei et al.'s Schottky diode.

With further regard to claim 7 it is argued, at page 16 of the remarks, that "Wei et al.'s element 54 provides an ohmic contact to the Schottky diode 44/46 (i.e. the work function of the metal is less than that of the semiconductor)." However, this statement is unsupported by Wei et al.'s disclosure. In point of fact Wei et al. states, "column readout

electrodes 54a-54d, respectively, are capacitively coupled to respective Schottky metal electrodes 46a-46d." Column 8 lines 34-35.

With further regard to claim 7 it is argued, at pages 16-17, that "Iranmanesh et al. teaches away from the advantageously claimed invention because Iranmanesh et al. teaches a structure having two adjoining single metal Schottky diodes, namely from the emitter to the base and from the collector to the base (FIG. 1, column 3 lines 50-55, column 5 lines 51-62; note that the first single metal Schottky diode is comprised of elements 52/14 in location 50, while the second single metal Schottky diode is comprised of elements 51/14 in location 30)." However, this statement appears to support the examiner's finding that first metal area 52 is coupled to semiconductor substrate, while doing nothing to refute the examiner's finding that barrier layer 54 is coupled to first metal area 52 and second metal area 51 is coupled to barrier layer. Applicant cites column 5 lines 51-62 of Iranmanesh et al. Immediately after the Applicant's cited passage, at line 63, Iranmanesh et al. state, "PtSi 52 is deposited and reacted so that one end contacts the $TiSi_2$." Note, column 5 lines 51-53, that the "$TiSi_2$" referred to in this passage is second metal area 51. Shortly thereafter, at column 6 lines 7-10, Iranmanesh et al. state, "A barrier metal interconnect region 54 is ... provided over the $TiSi_2$ 51 and PtSi 52 areas." This is the *prima facie* case of anticipation provided by Iranmanesh et al.: coupling between substrate 14 and first metal area 52; then between first metal area 52 and barrier metal interconnect region 54, and then between barrier metal interconnect region 54 and second metal area 51. Applicant's pointing out additional features found in Iranmanesh et al. does nothing to refute the prima facie case of anticipation.

Conclusion

6. THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thomas L. Dickey whose telephone number is 571-272-1913. The examiner can normally be reached on Monday-Thursday 8-6.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan J. Flynn can be reached on 571-272-1915. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more informa-

tion about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TLD
07/05

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